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Atmospheric Infrared Sounder

AIRS/AMSU/Aqua Operations Update

Denis Elliott

April 24, 2012

Outline

- **AIRS operations status**
- **AMSU-A operations status**
- **Aqua spacecraft status**
- **AMSR-E spin-up plans**
- **New AIRS gain table**

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AIRS Operations Status

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AIRS Operational Status

- **AIRS is in excellent health**
- **All engineering parameter plots versus time are either flat or changing extremely slowly—no concerns**
- **Some channels have degraded noise performance due to radiation dosage**
  - ***Many of the degraded channels have recently had their noise performance significantly improved by revising the on-board gain table***
  - ***Details later in this presentation***

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AIRS Chopper Drive Current

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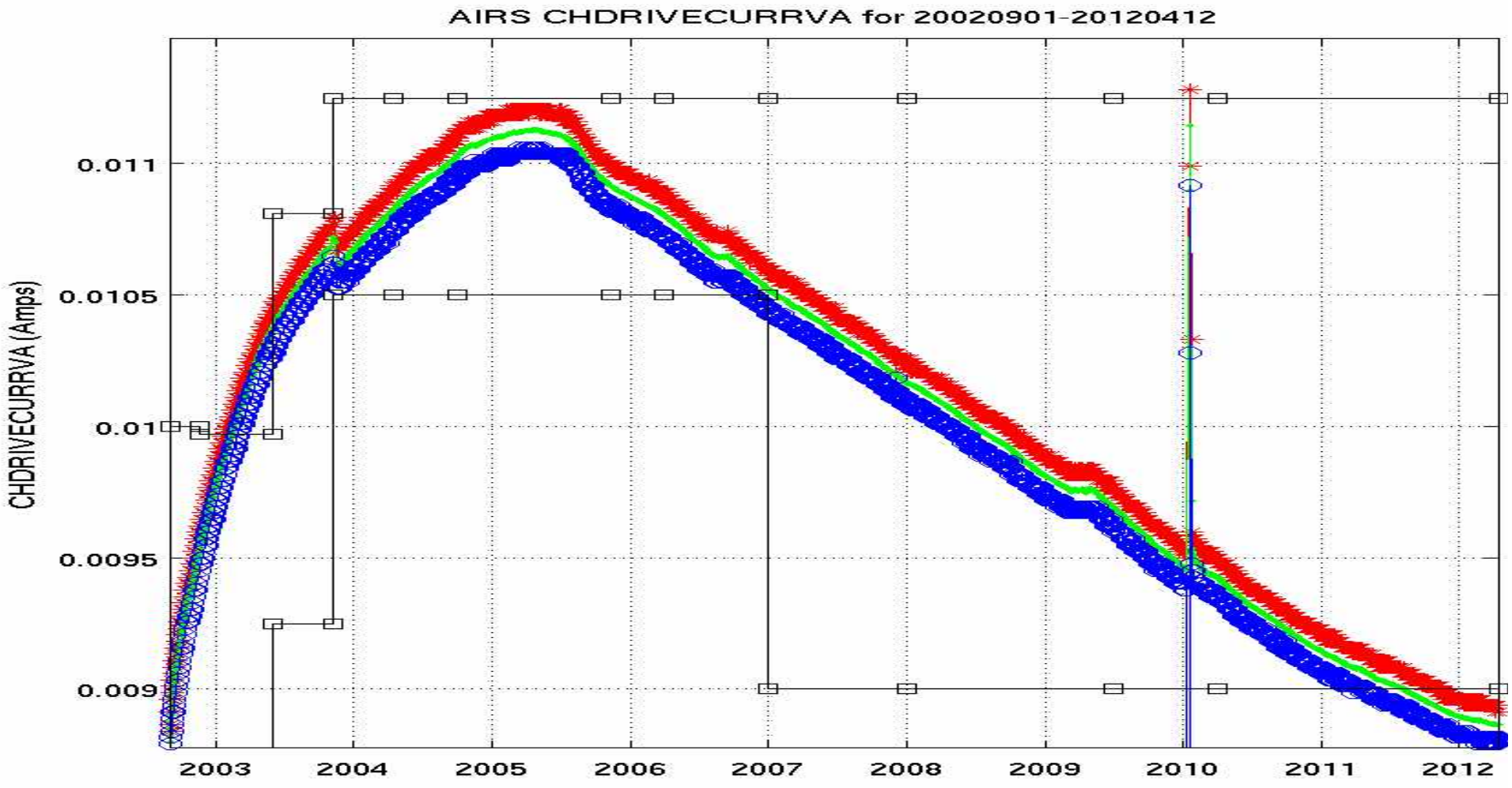

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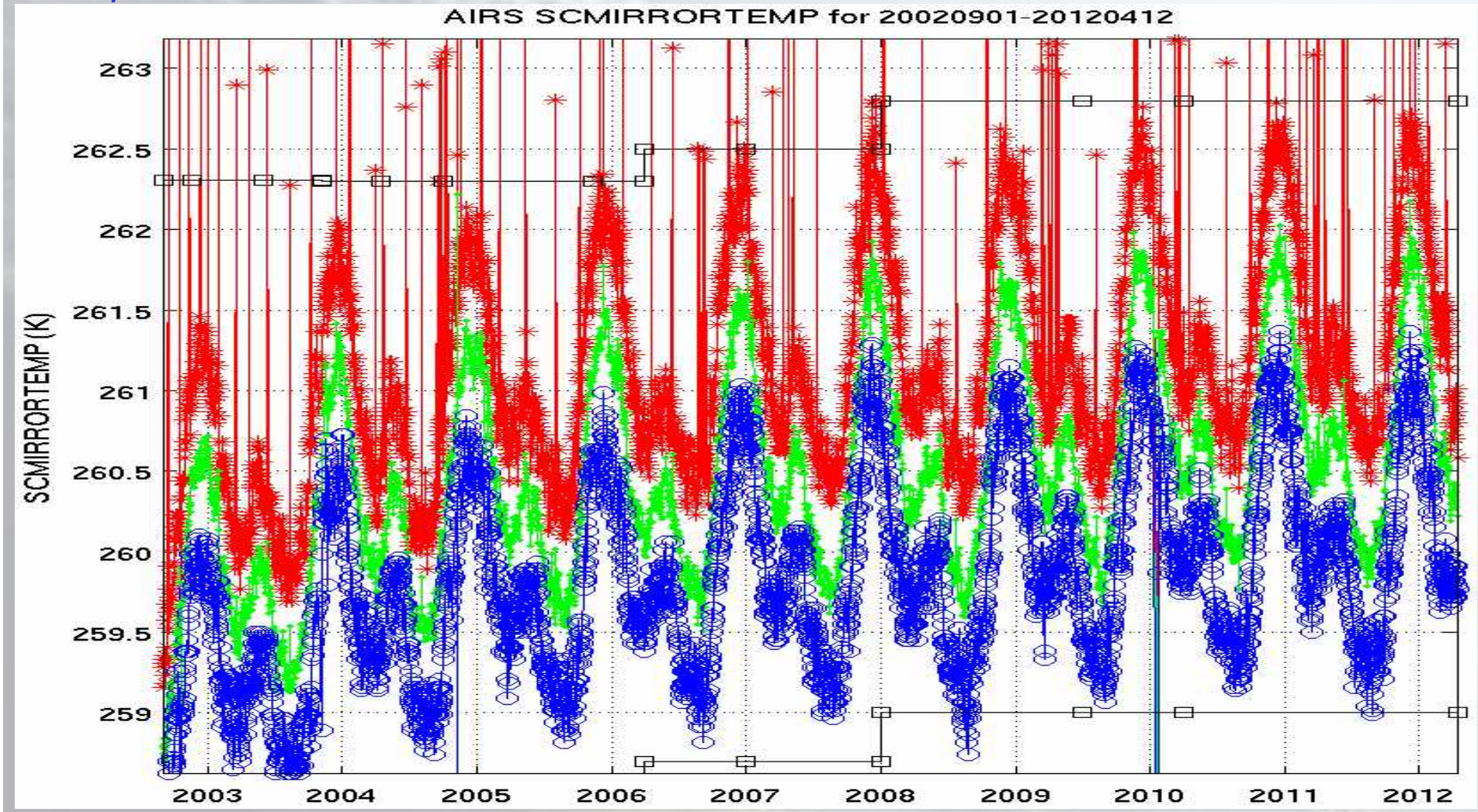
AIRS Scan Mirror Temperature

Atmospheric Infrared Sounder



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AIRS Choke Point Heater Current

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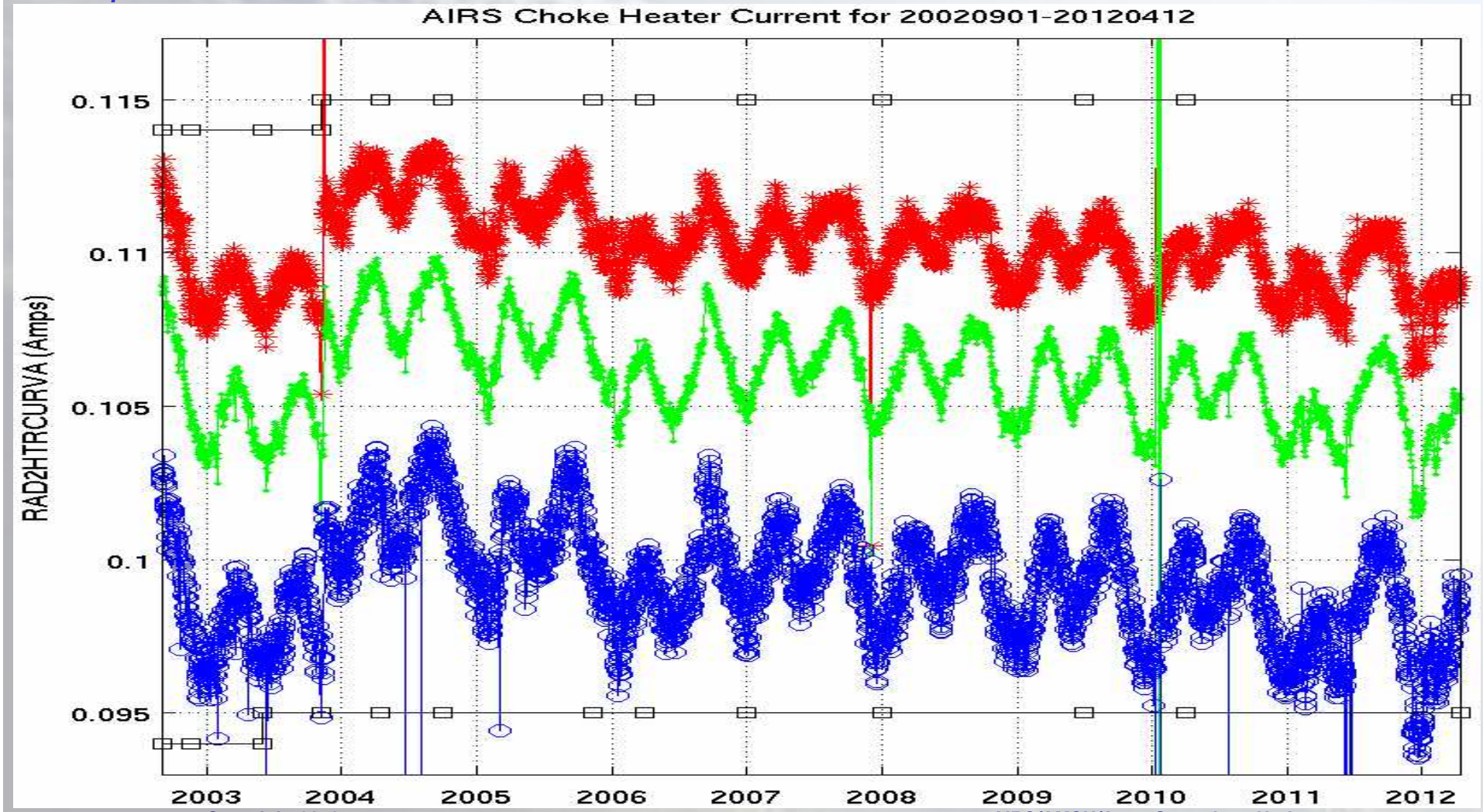

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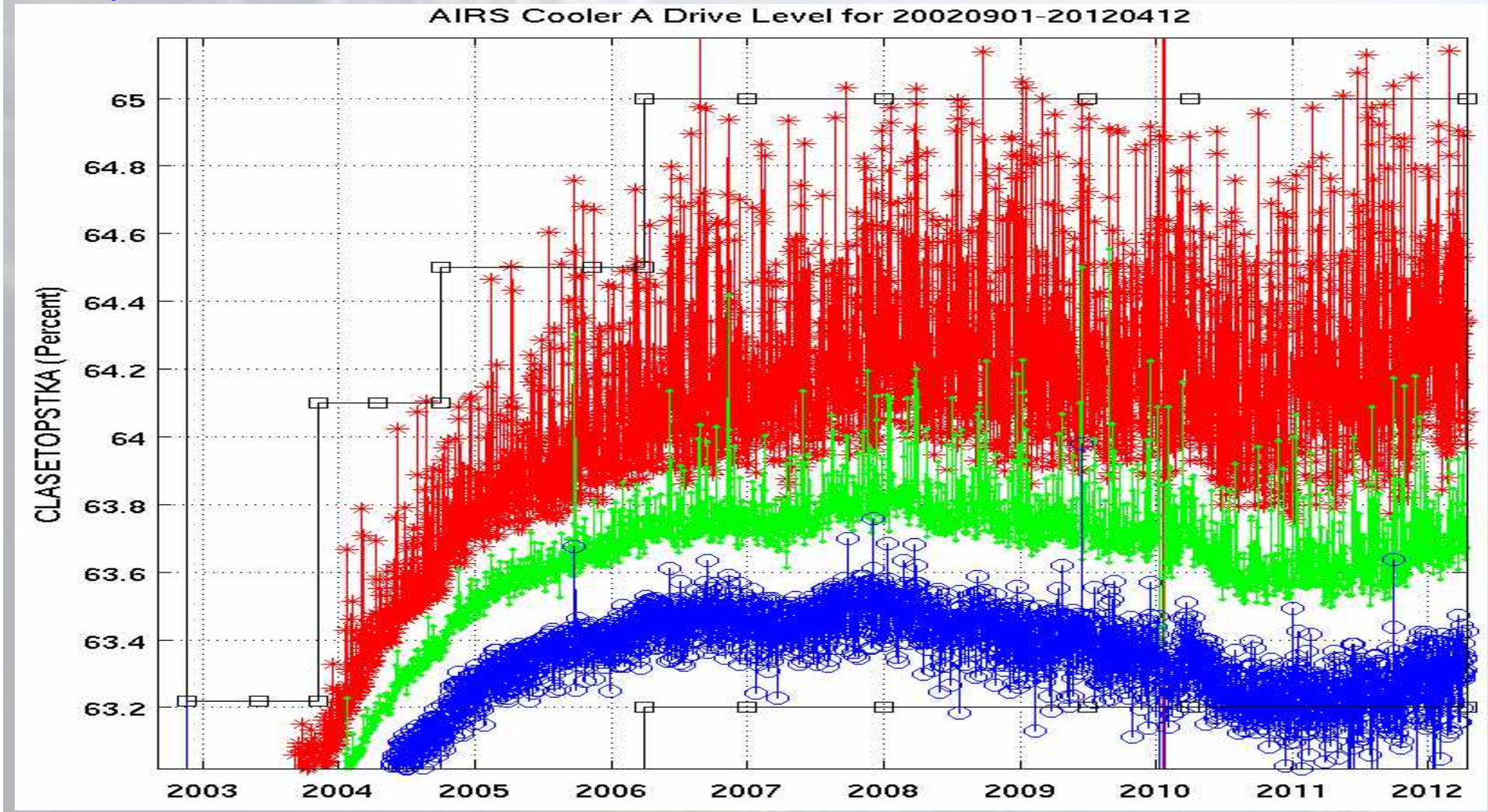
AIRS Cooler A Drive Level



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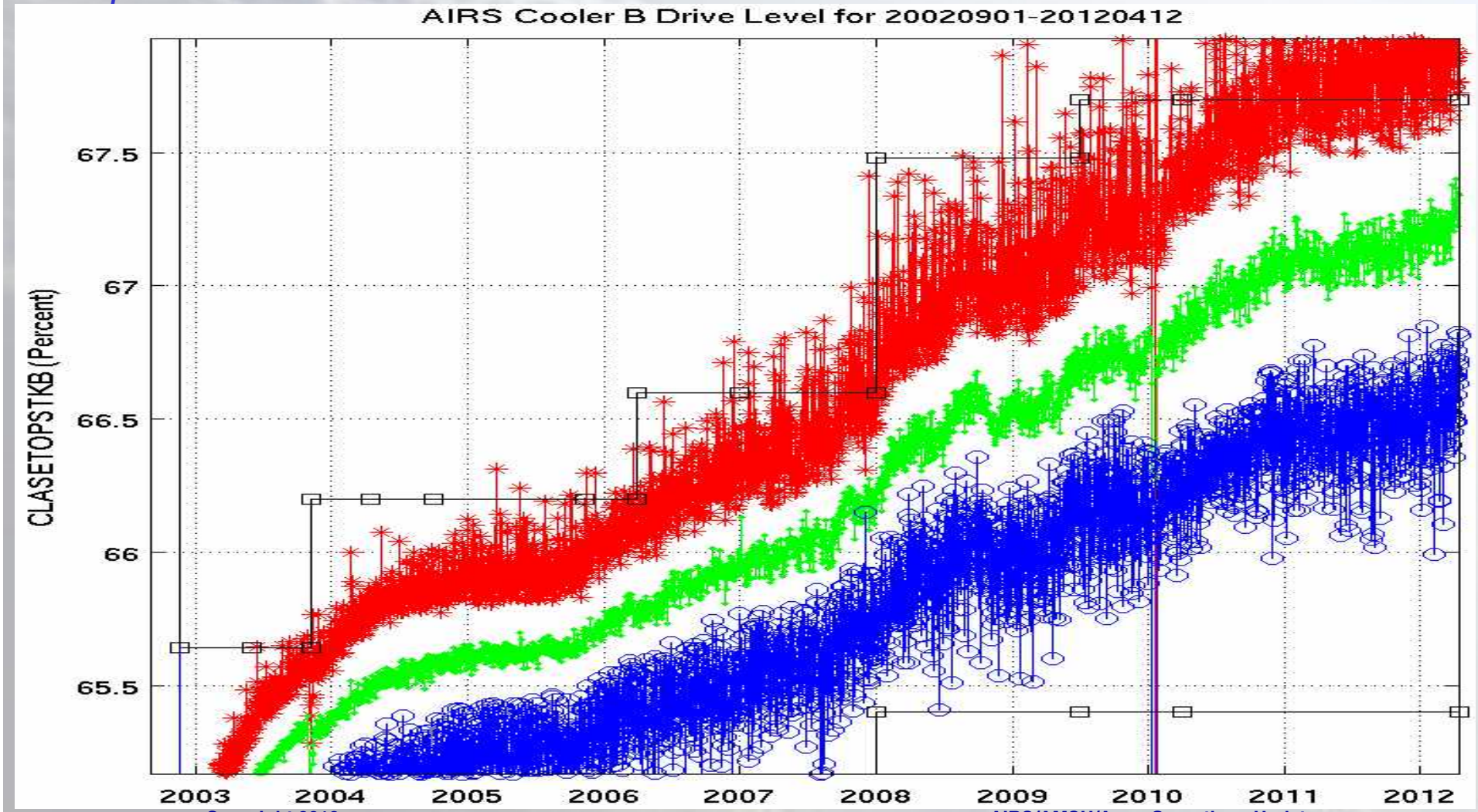
AIRS Cooler B Drive Level



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AIRS Focal Plane Temperature

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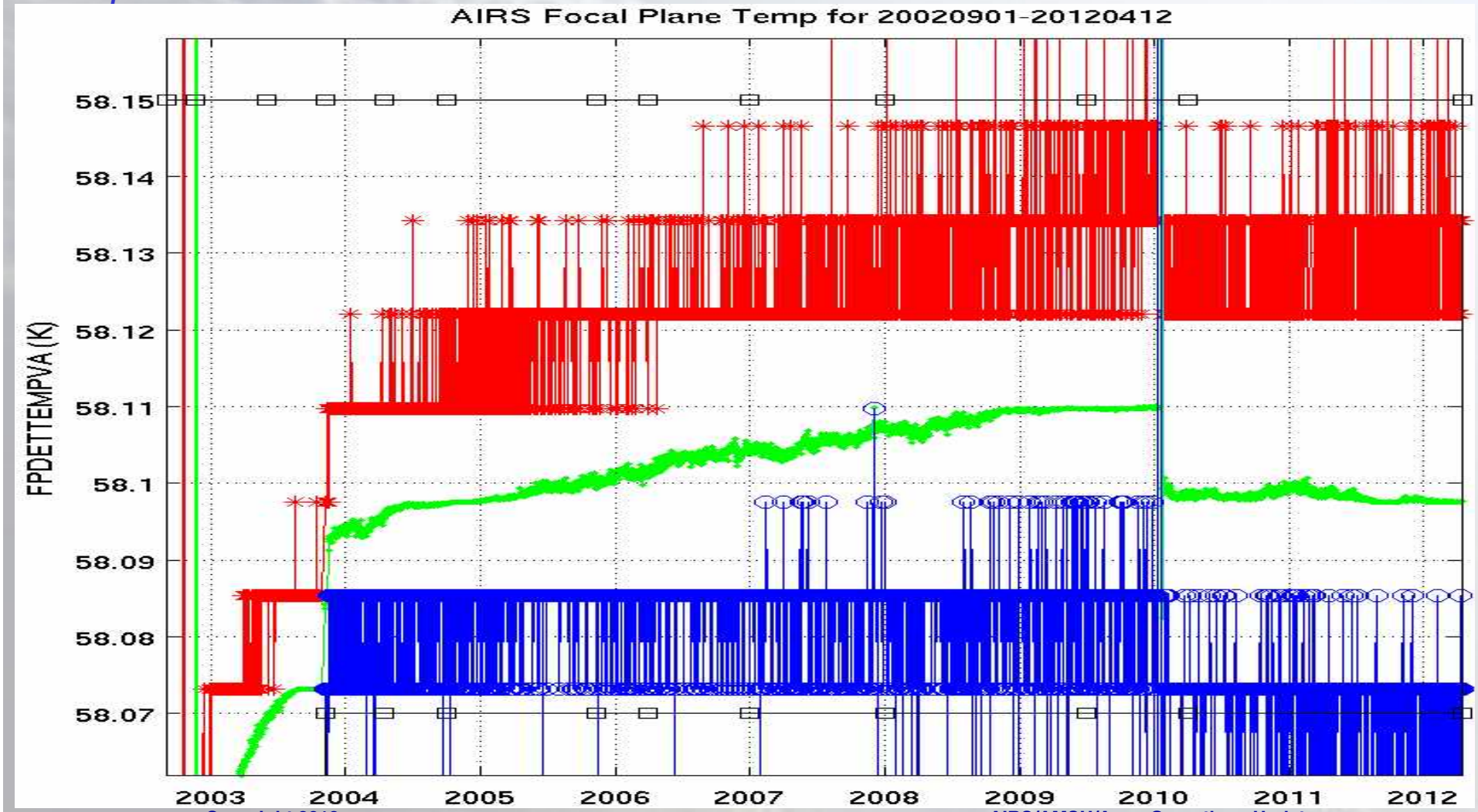

AMSU-A Status

AMSU-A Operational Status

- **AMSU-A mechanical parts and most of the electronics are in good health**
- **Engineering parameter trends are slow—no concerns**
- **10 of the 15 channels are healthy, but**
  - ***Channel 4 failed in 2007 (declared non-operational on October 1 2007)***
  - ***Channel 5 is now too noisy to contribute to Level 2***
  - ***Channel 7 noise has exceeded specs since launch and has never been used for L2***
  - ***Channel 6 has been degrading slowly since 2008***
  - ***Channel 1 recently began degrading***

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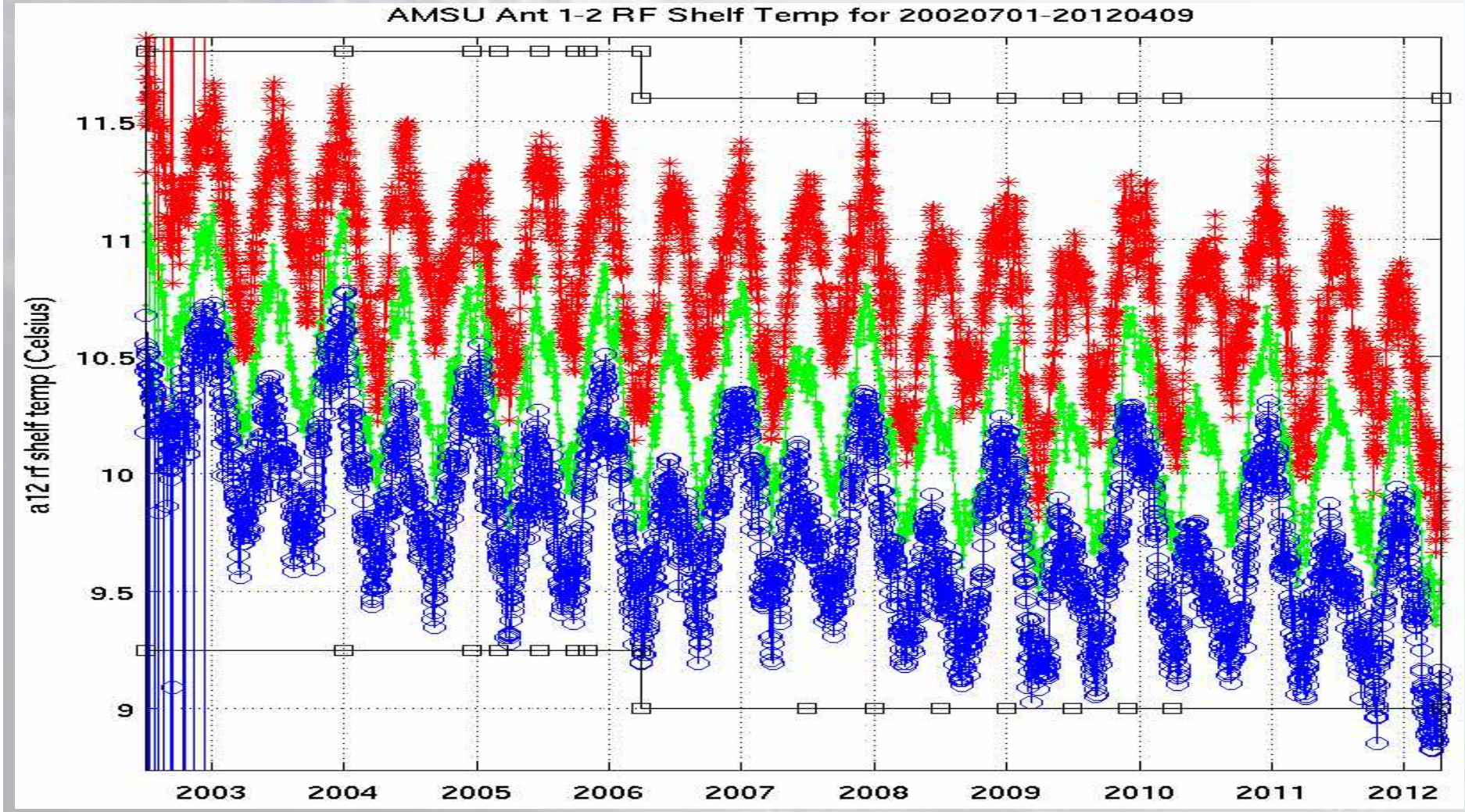
AMSU-A1-2 RF Shelf Temperature

Atmospheric Infrared Sounder



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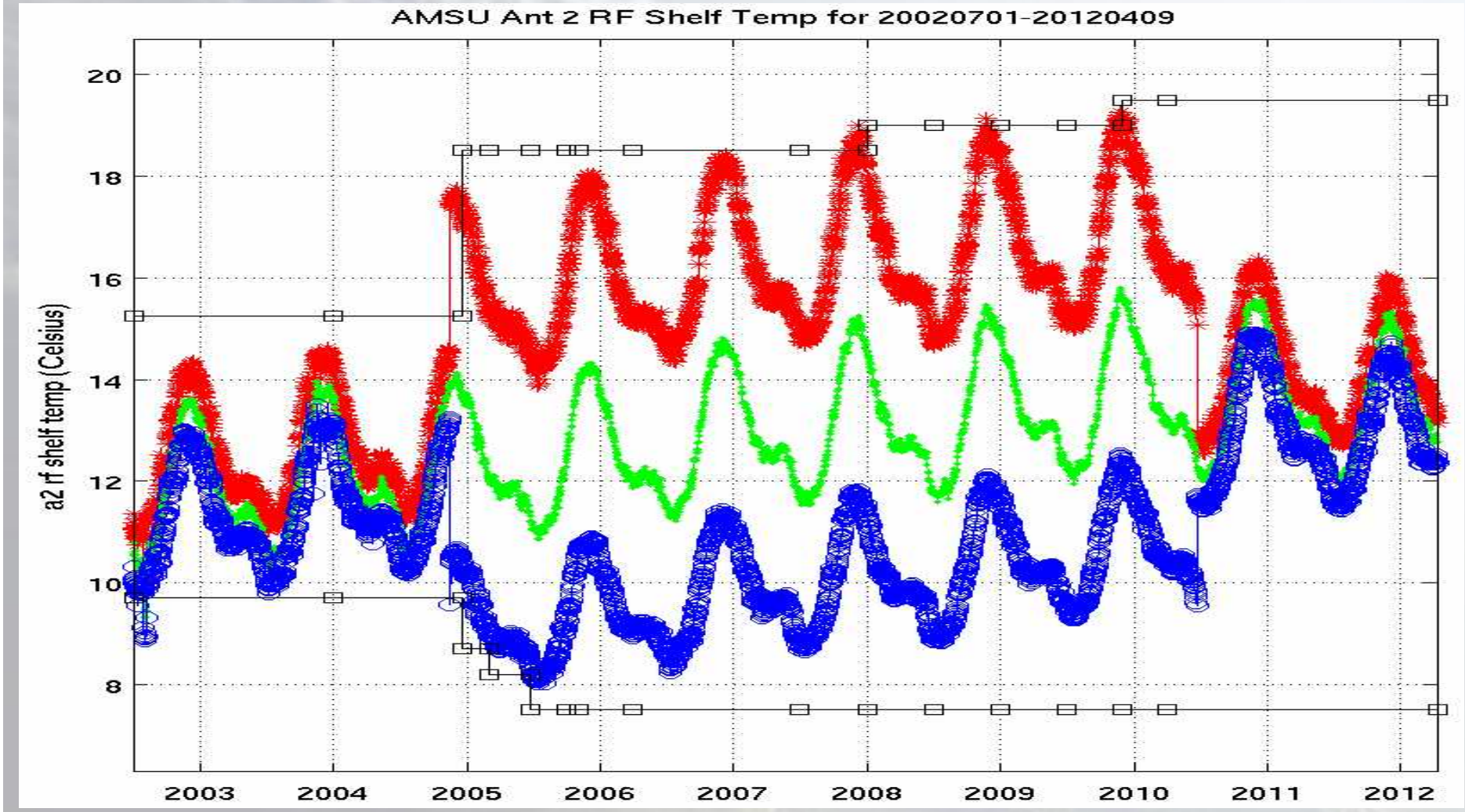
AMSU-A2 RF Shelf Temperature

Atmospheric Infrared Sounder



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AMSU-A1-2 Noisy Bus Current

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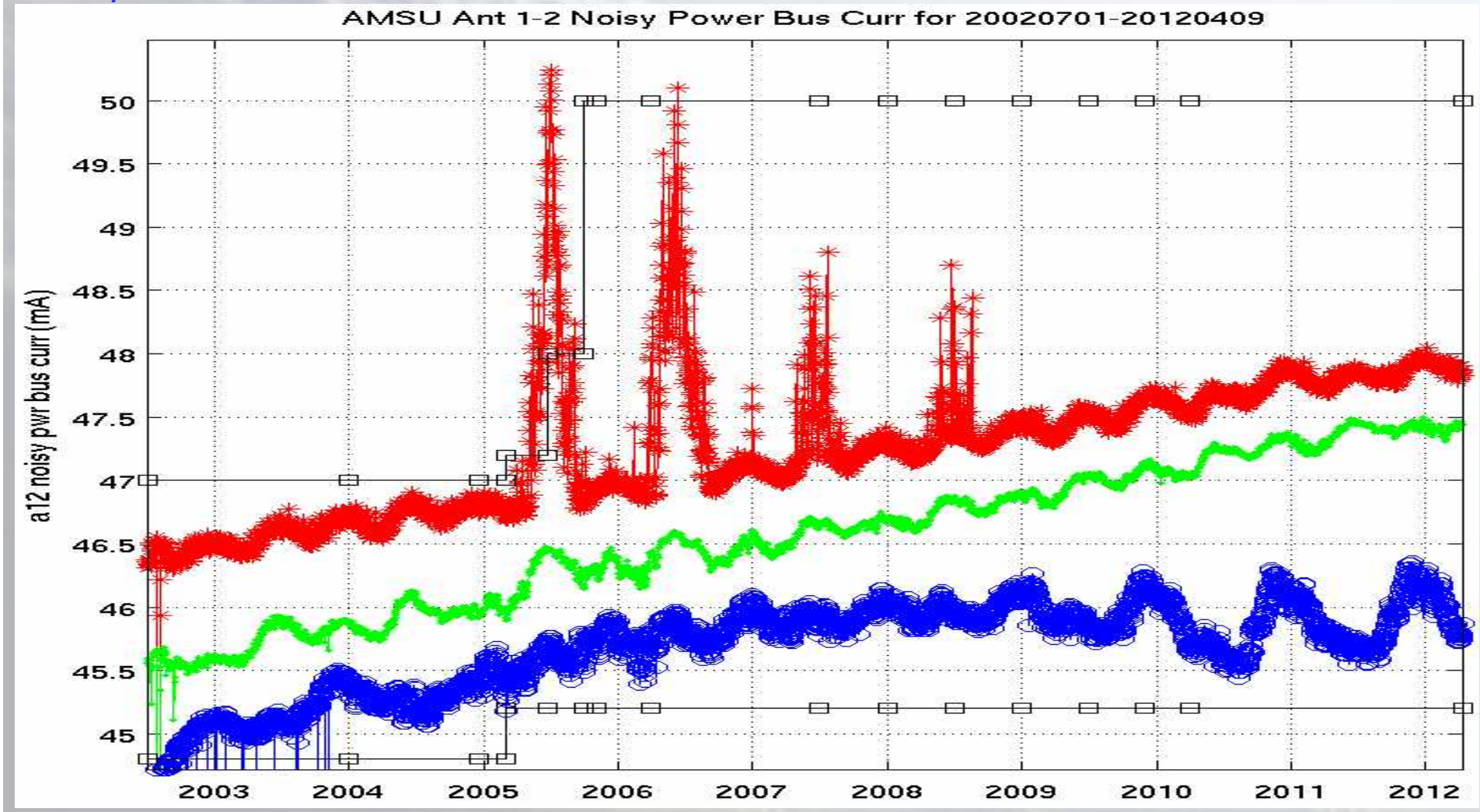

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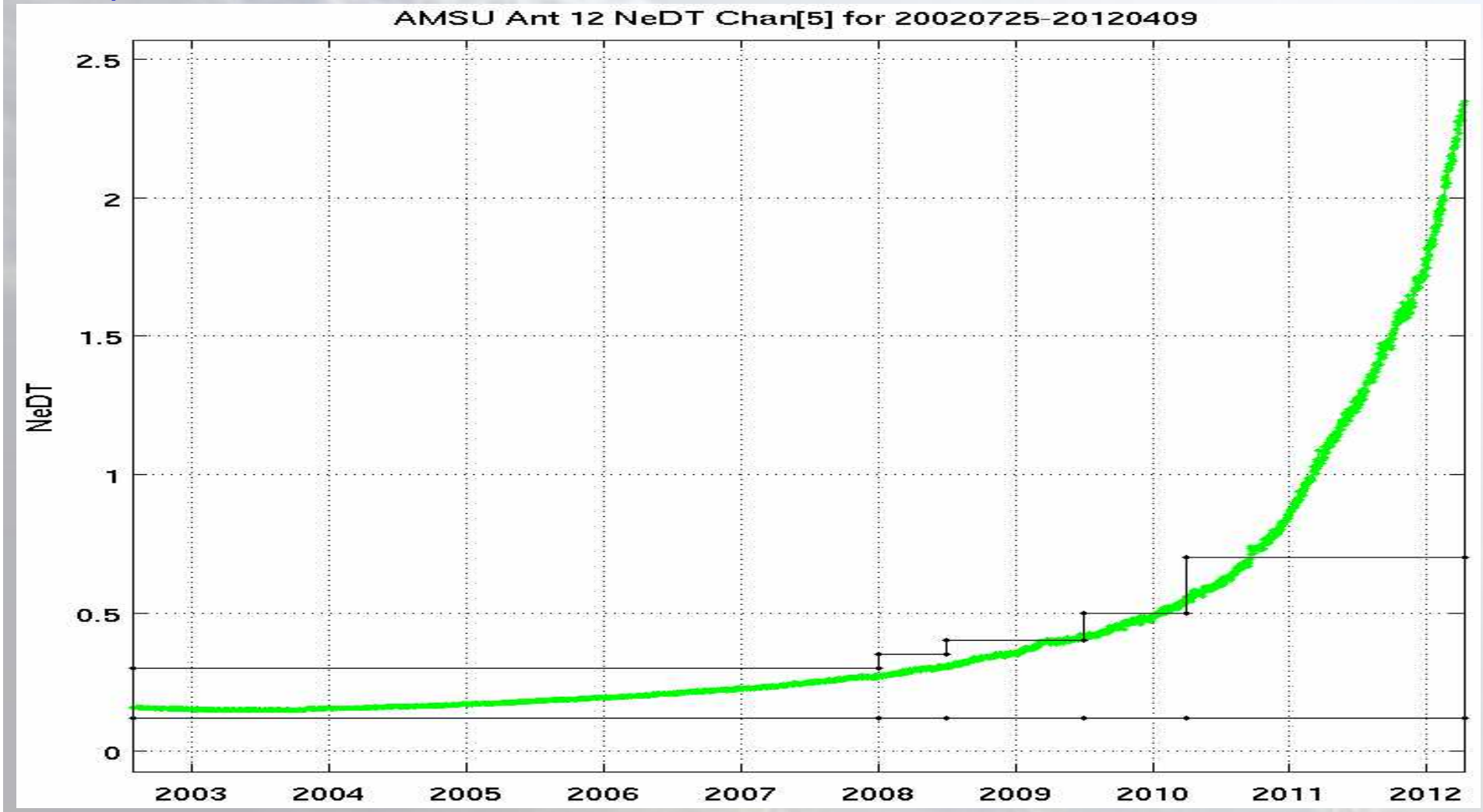
AMSU-A Channel 5 NEΔT

Atmospheric Infrared Sounder



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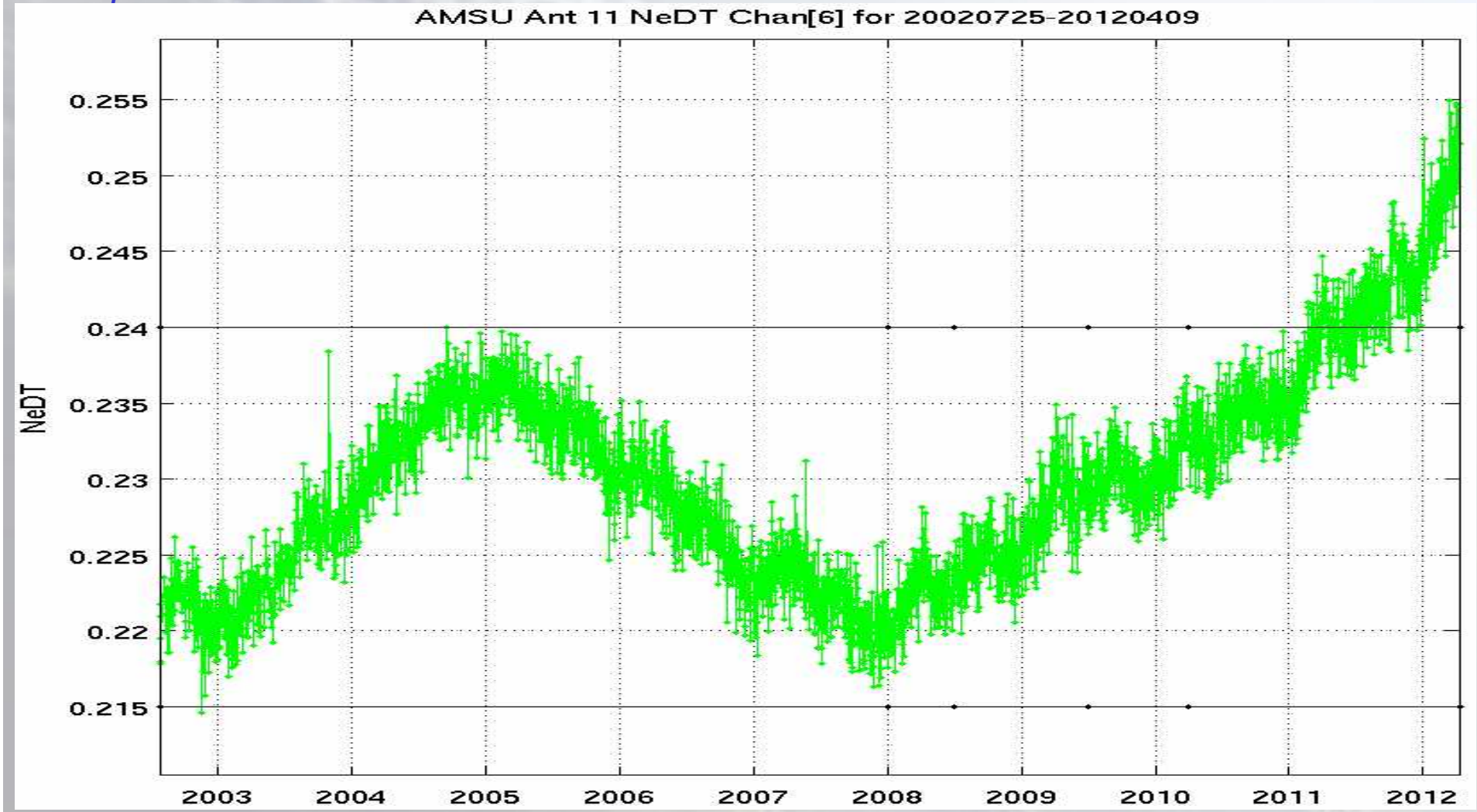
AMSU-A Channel 6 NEΔT

Atmospheric Infrared Sounder



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AMSU-A Channel 1 NEΔT

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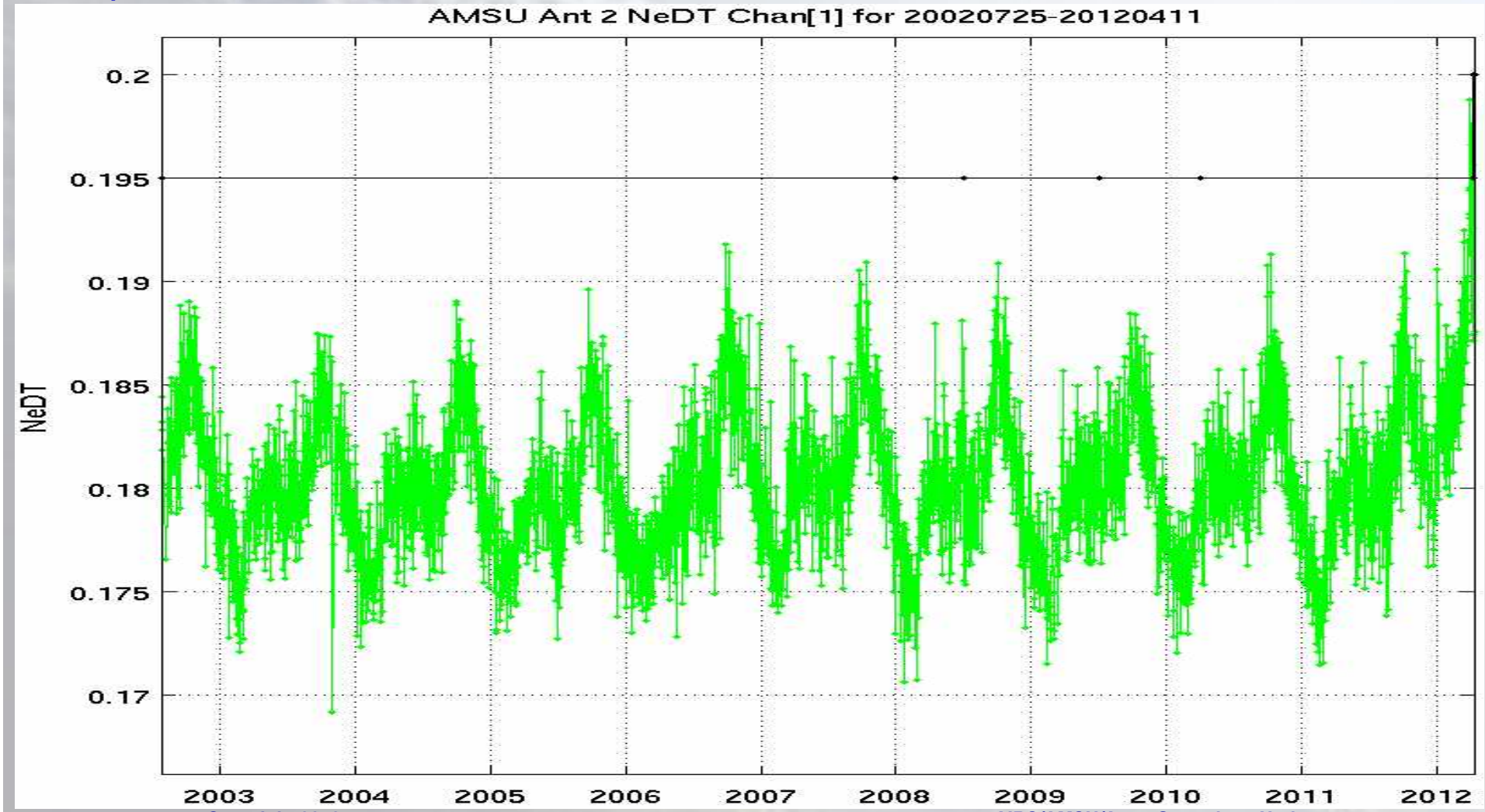

Aqua Status And Anomalies

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Aqua Spacecraft Health Status

- **Aqua is in very good health**
- **Several anomalies have occurred over the years**
- **All are considered minor**
- **None have yet impacted operations**

Aqua Fuel Supply

- **Occasional drag make up burns use only a very small amount of fuel**
- **Most fuel usage takes place in orbital inclination adjustment maneuvers, needed to keep Aqua properly aligned with other A-train instruments and to tightly control our 1:30 pm crossing time**
  - ***Three or four such maneuvers are planned every year, near the vernal equinox***
  - ***A recent estimate of future fuel usage indicates that the hydrazine should last at least until 2022, and possibly longer***

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Projected Aqua Fuel Usage

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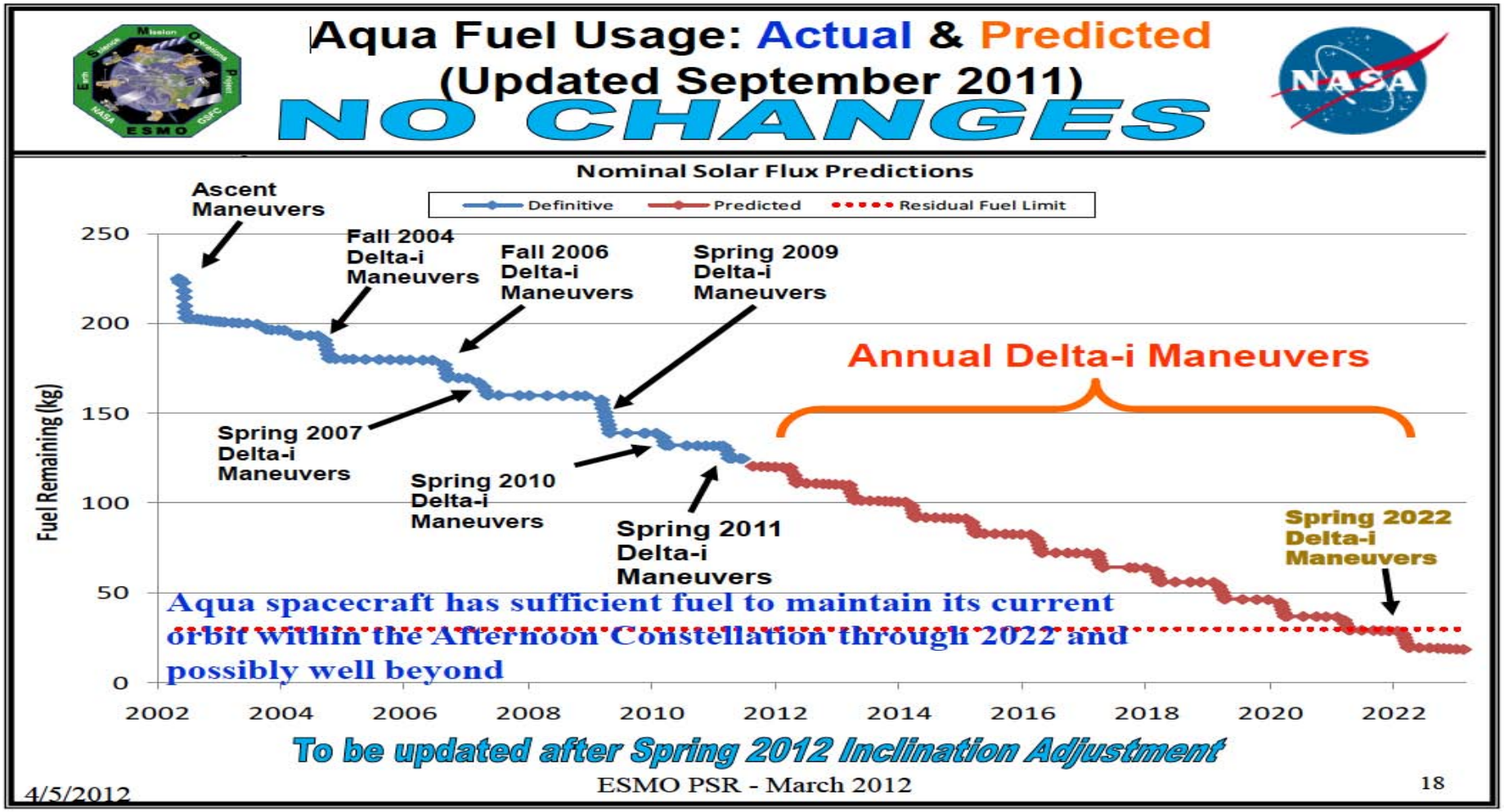

AMSR-E Spin-up Plans

AMSR-E Anomaly Background

- Suffered numerous anomalies (excess commanded torque and excess current in scanner) over the past several years
- On October 4 2011, in response to the largest of these anomalies yet seen, the instrument was commanded to slow from 40 rpm to 4 rpm
- When problems continued even at 4 rpm the antenna was parked
- Lubricant failure is probable cause
- Spacecraft jitter was seen in AIRS geolocation data during the spin down, but there was no noticeable impact to science on AIRS or any of the other instruments

AMSR-E Spin-Up

- Not yet declared dead
- AMSR-E team is requesting a spin-up to 4 rpm to enable cross-calibration with a new instrument, AMSR2, being launched on GCOM-W1 on May 18
- Earth Science Mission Operations (ESMO) project at GSFC, responsible for Aqua operations, is proposing spinning up to just 2 rpm, at least at first
- Planning for the spin-up and negotiations with JAXA are in progress
- No action likely before August

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New AIRS Gain Table

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Rationale For a New Gain Table

- A new detector gain table was tested on October 9 for 24 hours
- It changed the gains for 172 channels and was extremely successful as far as noise performance is concerned
- Worries about its possible impact on climate studies led to a second table that changed only 107 channels
- That table went operational on January 21

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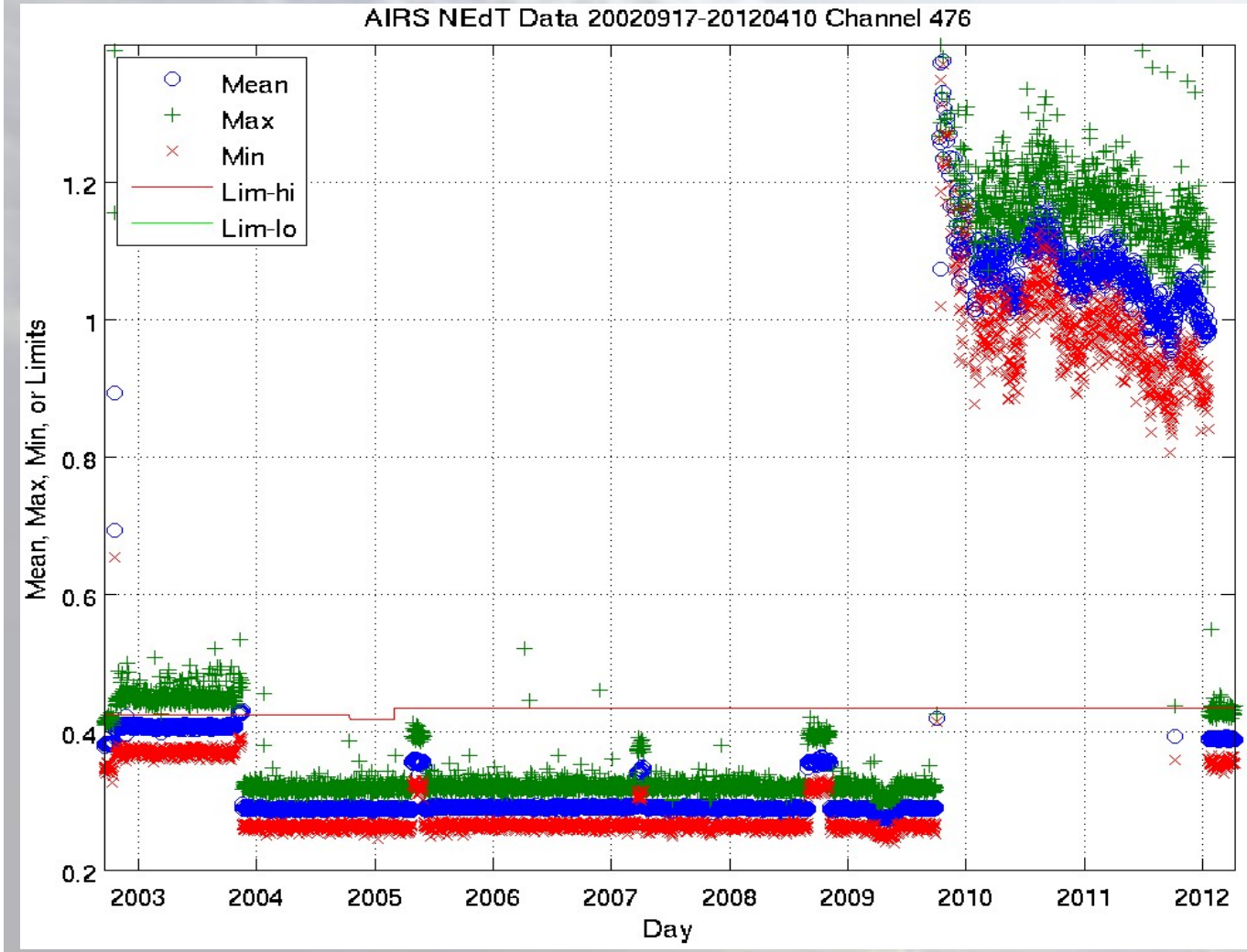
Channel 476 (801.5 cm^{-1})
A+B -> A



B side suffered radiation hit on 9/30/2009

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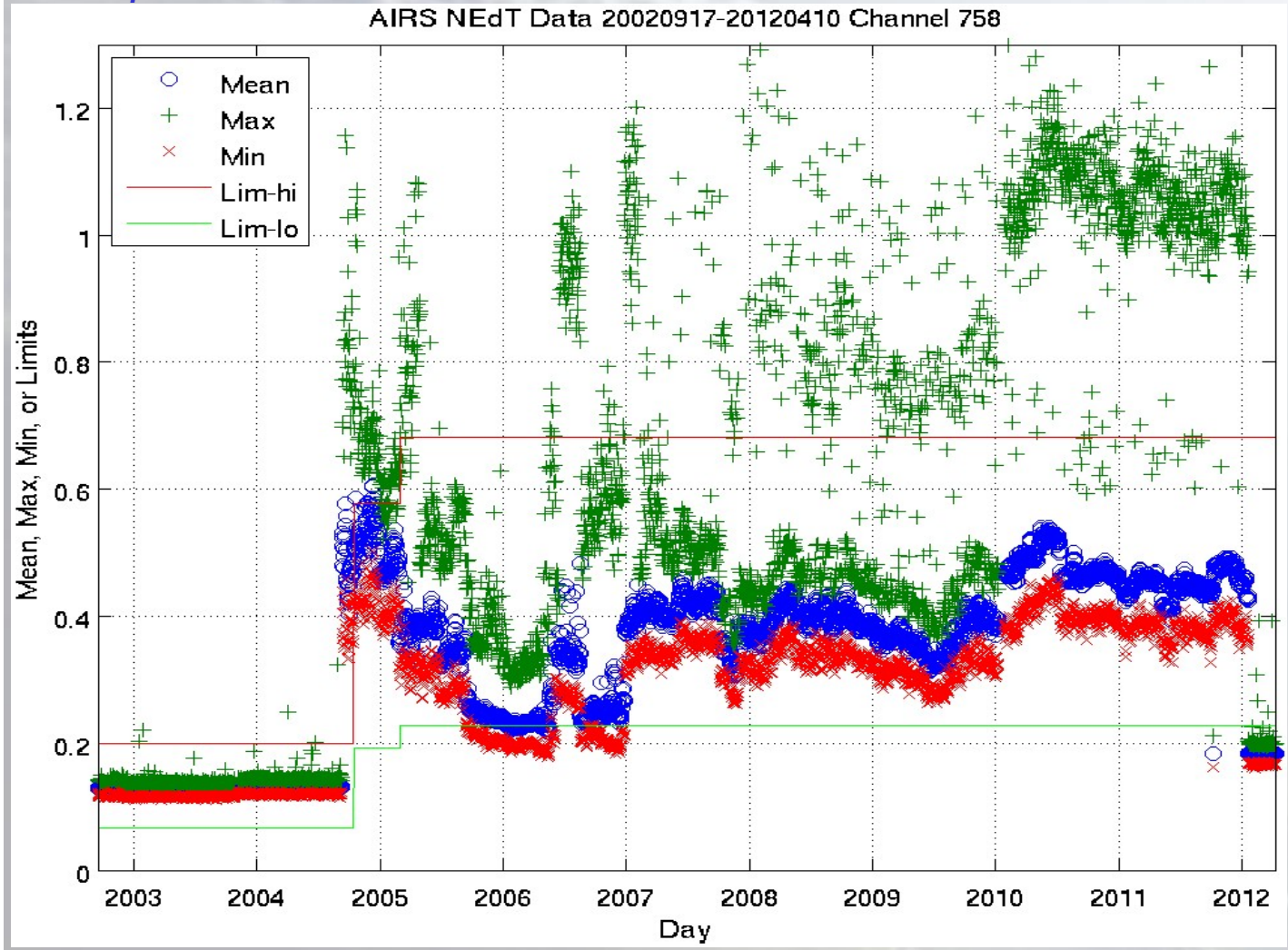
Channel 758 (900.0 cm^{-1})
A+B -> B



A-side suffered radiation hit in late 2004

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Channel 2357 (2642.2 cm^{-1}) A+B -> A

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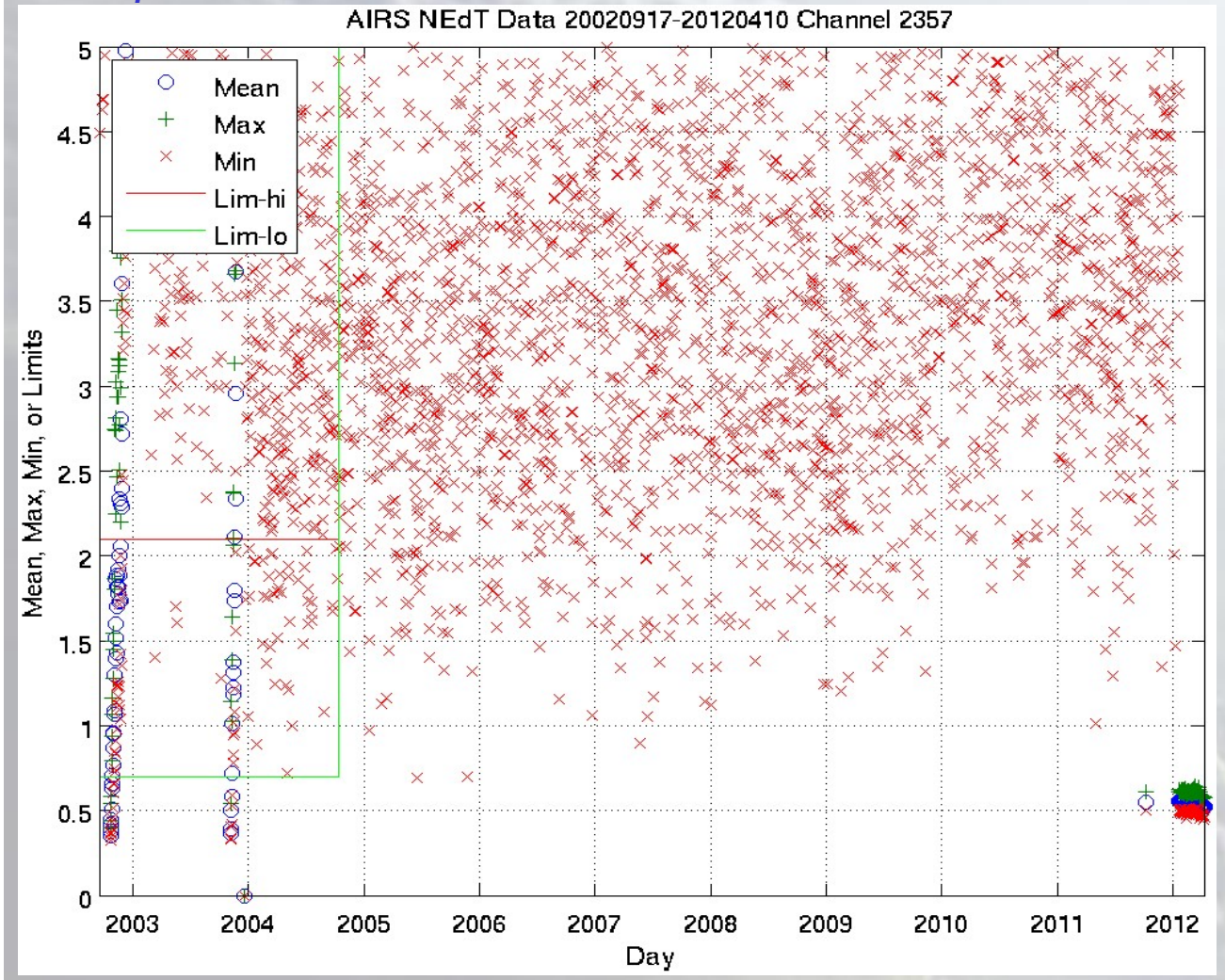

Channel looked good in A+B state immediately after the shutdown in late 2003

Almost immediately, steady deterioration set in

The problem was the B detector